

**UNITED STATES PATENT APPLICATION**

**INVENTION : HEMO-AIDE**

**INVENTOR : Clark, Robert**

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**VII. CLAIMS**

What is claimed is:

- 1 1. A fluid irradiation apparatus for the modification of viruses and bacteria, comprising:  
2 a housing having an exterior side and an interior side, the interior side further defining  
3 an enclosure;  
4 an irradiation station affixed to the housing;  
5 a cuvette positioned across the irradiation station;  
6 at least two ultraviolet light sources positioned adjacent to the cuvette;  
7 means for drawing and transporting fluid through the cuvette;  
8 means for receiving the fluid transported and irradiated through the cuvette;  
9 means for enclosing the cuvette and irradiation station when the fluid irradiation  
10 apparatus is in use for minimizing the escape of ultraviolet light radiation; and  
11 means for energizing the fluid irradiation apparatus.
- 1 2. The fluid irradiation apparatus of Claim 1 wherein the cuvette is made of a quartz  
2 crystal material.
- 1 3. The fluid irradiation apparatus of Claim 1 wherein the cuvette is made of a durable  
2 plastic material.

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1 4. The fluid irradiation apparatus of Claim 1 wherein the at least two ultraviolet light  
2 sources are, when in use, positioned on opposite sides of the cuvette.

1 5. The fluid irradiation apparatus of Claim 1 wherein one ultraviolet light source is  
2 mounted in the enclosure and the other ultraviolet light source is mounted in a cover.

1 6. The fluid irradiation apparatus of Claim 1 wherein the at least two ultraviolet light  
2 sources are calibrated in the UVA, UVB, or UVC light transmission band widths.

1 7. The fluid irradiation apparatus of Claim 6 wherein the at least two ultraviolet light  
2 sources are calibrated between 40 and 400 nano meters.

1 8. The fluid irradiation apparatus of Claim 1 wherein the means for drawing and  
2 transporting fluid through the cuvette is by a peristaltic pump.

1 9. The fluid irradiation apparatus of Claim 1 wherein the means for drawing and  
2 transporting fluid through the cuvette is by an ivac bottle.

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1 10. The fluid irradiation apparatus of Claim 1 wherein the means for receiving the fluid  
2 transported and irradiated through the cuvette is a bottle.

1 11. The fluid irradiation apparatus of Claim 5 wherein the means for enclosing the cuvette  
2 and irradiation station when the fluid irradiation apparatus is in use is the cover.

1 12. The fluid irradiation apparatus of Claim 1 and further comprising an on/off power  
2 switch, an on/off pump control switch, and an ultraviolet light control switch.

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1 13. A fluid irradiation apparatus for the modification of viruses and bacteria contained in  
2 fluid, comprising:

3 a housing having an exterior side and an interior side, the exterior side further defining  
4 an aperture and the interior side further defining a hollow center;

5 a cuvette positioned across substantially the surface area of the aperture and aligned  
6 in a substantially parallel relationship with the housing;

7 a first ultraviolet light source located within the hollow center of the interior side of  
8 the housing and positioned parallel to the cuvette;

9 a cover having an exterior side and an interior side, the interior side further defining  
10 a chamber;

11 a second ultraviolet light source located within the chamber;

12 means for receiving the fluid transported through the cuvette;

13 means for transporting the fluid through the cuvette into the means for receiving the  
14 fluid;

15 means for returning the fluid back through the cuvette from the means for receiving  
16 the fluid;

17 whereby, the fluid transferred through the same cuvette is irradiated in at least two  
18 separate instances by both the first and second ultraviolet light sources.

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1 14. The fluid irradiation apparatus of Claim 13 and further comprising a means for  
2 drawing the fluid through the cuvette.

1 15. The fluid irradiation apparatus of Claim 13 and further comprising a means for  
2 enclosing the cuvette when the fluid irradiation apparatus is in use.

1 16. The fluid irradiation apparatus of Claim 13 and further comprising a means for  
2 controlling the operation of the fluid irradiation apparatus.

1 17. The fluid irradiation apparatus of Claim 13 and further comprising a faceplate that is  
2 fitted within the aperture in the exterior side of the housing.

1 18. The fluid irradiation apparatus of Claim 13 wherein the further comprising a lens for  
2 covering the second ultraviolet light source.

1 19. The fluid irradiation apparatus of Claim 13 wherein the second ultraviolet light source  
2 is positioned, when in use, on the opposite side of the cuvette from the first ultraviolet light  
3 source.

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1     20.     A method for modifying viruses and bacteria from fluid in the body, comprising the  
2     steps of:

3           (a)     providing a fluid irradiation apparatus consisting of a housing and an  
4     irradiation station in the housing;

5           (b)     removing fluid from the body and depositing the fluid into a conduit;

6           (c)     transporting the removed fluid from the body along the conduit and into a  
7     cuvette;

8           (d)     irradiating the removed fluid at the irradiation station within the cuvette by at  
9     least two ultraviolet light sources;

10          (e)     transporting the irradiated fluid from the cuvette along the conduit and  
11     depositing the irradiated fluid into a container;

12          (f)     removing the irradiated fluid from the container and depositing the fluid back  
13     into the conduit;

14          (g)     transporting the irradiated fluid back through the same conduit and back into  
15     the same cuvette;

16          (h)     irradiating the irradiated fluid within the cuvette by the at least two ultraviolet  
17     light sources to produce a second irradiated fluid;

18          (i)     transporting the second irradiated fluid back through the same conduit from  
19     the cuvette;

20          (j)     returning the second irradiated fluid into the body.

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1     21.     The method of Claim 20 and the additional step of directing ultraviolet radiation from  
2     the at least two ultraviolet light sources at the cuvette.

1     22.     A method for modifying viruses and bacteria from fluid in the body, comprising the  
2     steps of:

3           (a)     transporting fluid through a conduit into a cuvette;

4           (b)     providing a plurality of ultraviolet light sources at the cuvette;

5           (c)     irradiating the fluid in the cuvette as it passes the plurality of ultraviolet light  
6     sources to produce a first irradiated fluid;

7           (d)     reversing the directional flow of the fluid to pass back through the same  
8     cuvette; and

9           (e)     irradiating the first irradiated fluid as it passes the plurality of ultraviolet light  
10    sources a second time to produce a second irradiated fluid.